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EXAMINER

MILLER, MICHAEL G

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Response to Amendment

- 1) Examiner notes the amendment submitted 17 APR 2008. The amendment has support in the specification as originally presented and is therefore accepted.

Response to Arguments

- 2) Applicant's arguments filed 17 APR 2008 have been fully considered but they are not persuasive.
- 3) Applicant's first argument is that Bomberger only teaches exposing the substrate to temperatures below 900 degrees F. Examiner respectfully disagrees and points to Column 2 Lines 15-19 to show a teaching of a service temperature of 1000 degrees F using a interdiffused surface layer of zinc and then to Column 2 Lines 33-39 to show a teaching of forming the interdiffused layer by exposing the part to zinc vapors at 1200 degrees C. The part is treated at temperatures well above 650 degrees C as claimed and is therefore capable of being operated at temperatures above 650 degrees C as claimed.
- 4) Applicant's second argument is that Klotz does not remotely teach coating a titanium substrate. Examiner respectfully disagrees and quotes from Klotz: "This invention relates to a coated article and coating composition and method for making same and more specifically to an improved corrosion resistant and decorative coating **for metal** or other **substrates** which are subject to deterioration by water, salt spray or

the like." (Column 1 Lines 19-23, emphasis added by Examiner) Titanium is a metal.

- 5) Applicant's third argument is that Bomberger only teaches coating the substrate by cladding. Examiner respectfully disagrees and refers to the first argument above; the response thereto teaches the interdiffusion layer of zinc. Zinc is a metal capable of oxidizing; therefore Bomberger teaches a suitable metal oxide based anticorrosive coating on a titanium alloy substrate.
- 6) Applicant's fourth argument is that the combination of Claim 1 shows surprising results because the coating combines with oxides on the surface of the substrate. Examiner respectfully points out that this statement is purely declarative with no evidence having been presented to support it; further, the compositions of Klotz teach component materials capable of interacting with oxides (in particular the magnesium hydrogen phosphate and the phosphoric acid, Examples 1-4, Column 3). "[T]he discovery of a previously unappreciated property of a prior art composition, or of a scientific explanation for the prior art's functioning, does not render the old composition patentably new to the discoverer." *Atlas Powder Co. v. Ireco Inc.*, 190 F.3d 1342, 1347, 51 USPQ2d 1943, 1947 (Fed. Cir. 1999).
- 7) As none of Applicant's arguments are found persuasive, all previous rejections are maintained.

8) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9) Claims 1-9 and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klotz (U.S. Patent 3,395,027, hereinafter '027) in view of Bomberger et al (U.S. Patent 3,434,813, hereinafter '813).

10) With regard to Claim 1, '027 teaches a method of coating a substrate, the method comprising:

- a) Applying to the substrate a coating comprising a source of a ceramic-forming metal oxide (Column 2 Lines 22-34) and a source of a phosphate binder for the metal oxide (Column 2 Lines 40-62), and
- b) Causing the metal oxide and the phosphate to cure to form a diffusion barrier comprising a phosphate bonded ceramic on the titanium alloy substrate (Column 3 Line 49 – Column 5 Line 11).
- c) '027 does not explicitly teach a titanium alloy substrate, though it does teach applying its coatings to metal substrates which are subject to deterioration by water, salt spray or the like (Column 1 Lines 19-29).
- d) '813 teaches that titanium-base alloys are subject to deterioration by ocean spray at elevated temperatures (Column 1 Lines 26-31).

- e) Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified the coating method as taught in '027 to coat a titanium alloy substrate as taught in '813 because '027 teaches a method of coating suitable for metals subject to deterioration in salt-containing environments and '813 teaches that titanium alloy is subject to deterioration in salt-containing environments at elevated temperatures.
- f) '813 teaches application of the anticorrosion layer at 1200 degrees C (Column 2 Lines 33-39); '027 teaches that there is no harm to using this high of a temperature with the coating it teaches (Column 3 Line 63 – Column 4 Line 6). 1200 degrees C is well above the claimed temperature of 650 degrees C and thus the substrate is configurable to operate in environments of at least 650 degrees C.

11) With specific regard to Claim 2, which includes all the limitations of Claim 1 above, '027/'813 teaches a method according to Claim 1, wherein:

- a) The coating is applied in one step ('027 Column 3 Lines 49-53).

12) With specific regard to Claim 3, which includes all the limitations of Claim 1 above, '027/'813 teaches a method according to Claim 1, wherein:

- a) The coating is applied as an acidic aqueous medium comprising the oxide source and the phosphate source ('027 Column 2 Lines 5-9).

13) With specific regard to Claim 4, which includes all the limitations of Claim 1 above, '027/'813 teaches a method according to Claim 1, wherein:

- a) The oxide source is selected from oxides and hydroxides of magnesium, aluminium, iron, chromium, sodium, zirconium and calcium, and any mixture or chemical or physical combination thereof ('027 Column 3 Lines 14-46, all examples teach magnesium and chromium oxides or combinations thereof).

14) With specific regard to Claim 5, which includes all the limitations of Claim 1 above, '027/'813 teaches a method according to Claim 1, wherein:

- a) The phosphate source is selected from phosphoric acid and phosphates of potassium, aluminium, ammonium, beryllium, calcium, iron, lanthanum, lithium, magnesium, magnesium-sodium, magnesium-potassium, sodium, yttrium, zinc, zirconium, and any mixture or chemical or physical combination thereof ('027 Column 3 Lines 14-46, all examples teach phosphoric acid or magnesium dihydrogen phosphates).

15) With specific regard to Claim 6, which includes all the limitations of Claim 4 above, '027/'813 teaches a method according to Claim 4, wherein:

- a) The oxide source is selected from magnesium oxide, chromium oxide and mixtures thereof ('027 Column 3 Lines 14-46).

16) With specific regard to Claim 7, which includes all the limitations of Claim 3 above, '027/'813 teaches a method according to Claim 3, wherein:

- a) The acidic aqueous medium further comprises one or more optional additional ingredients ('027 Column 3 Lines 14-46, all examples contain nitric acid and aluminum particles).

17)With specific regard to Claim 8, which includes all the limitations of Claim 7 above,

'027/'813 teaches a method according to Claim 7, wherein:

- a) The one or more optional additional ingredient is selected from one or more of rheology modifiers, buffers, pH reducers, oxidising agents, reducing agents, other cure retardants and surfactants ('027 Column 3 Lines 14-46, wherein nitric acid is a pH reducer and aluminum powder is a rheology modifier which will thicken the solution by its presence).

18)With specific regard to Claim 9, which includes all the limitations of Claim 3 above,

'027/'813 teaches a method according to Claim 3, wherein:

- a) The acidic aqueous medium consists essentially of the oxide source, the phosphate source, water, and optionally one or more of rheology modifiers, buffers, pH reducers, oxidising agents, reducing agents, other cure retardants or surfactants, with less than about 10% by weight of other ingredients ('027 Column 3 Lines 14-46, by above interpretations there is 0% by weight of other ingredients as the nitric acid and aluminum particles are a pH reducer and rheology modifier respectively).

19)With specific regard to Claim 11, which includes all the limitations of Claim 1 above,

'027/'813 teaches a method according to Claim 1, wherein:

- a) The coating is applied in a thickness of up to about 25 μm ('027 Column 4 Lines 12-16; .0005in = 12.7 μm).

20)With specific regard to Claim 12, which includes all the limitations of Claim 1 above,

'027/'813 teaches a method according to Claim 1, wherein:

- a) Curing of the coating is initiated by heating the coating ('027 Column 3 Line 49 – Column 5 Line 11)

21) Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '027/'813 in view of Mosser et al (U.S. Patent 5,803,990, hereinafter '990), Trocynski et al (U.S. PGPub 2002/0107133, hereinafter '133) and Wydra et al (U.S. Patent 3,857,717, hereinafter '717).

22) With specific regard to Claim 10, which includes all the limitations of Claim 1 above, '027/'813 teaches a method according to Claim 1, wherein:

- a) The coating is applied as substantially the following composition (Column 3 Lines 32-39, Example 3):
 - i) Water
 - ii) Phosphoric acid
 - iii) Chromium trioxide
 - iv) Magnesium oxide
 - v) Spherical aluminum particles
 - vi) Nitric acid
- b) Neither '027 nor '813 teach chromium oxide, clay or magnesium hydrogen phosphate explicitly. In addition, '027 teaches nitric acid which is not called for by Applicant.
- c) Justification For Removing Nitric Acid
 - i) '990 teaches a method of providing a protective coating to titanium alloys (Column 11 Lines 22-25). Therefore it would have been obvious to combine

the method of '027/'813 with the method of '990 because both pieces of art want to apply an anti-corrosion coating to titanium alloys.

- ii) In the related process of '990 (Column 7 Line 15 – Column 11 Line 14), boric acid is used as an additive.
 - iii) '990 requires the borate ions as provided by the aforementioned boric acid as a manner of pH adjustment (Column 5 Lines 23-25).
 - iv) Both '027 and '990 speak of adding the borate/nitrate ion to the coating solution, preferentially as an acid but acceptably as a metal salt ('027 – Column 3 Lines 63-68; '990 – Column 5 Lines 16-20). '990 also says that the pH may be lowered by adding sources of the phosphate ion including phosphoric acid and metal acid salts (Column 3 Lines 64-67). This leads to the conclusion that borate, nitrate and phosphate ions are all pH adjusters.
 - v) '027/'813/'990 discloses the immediately relevant portion of the claimed invention except that '027/'813/'990 has a mixture of pH adjusting ions instead of a single source (phosphates). '027/'813/'990 shows that phosphate ions and nitrate ions are equivalent structures known for this purpose in the art. Therefore, because these two ions were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute phosphate ions for nitrate ions and thereby to add phosphate ion-producing chemicals in place of nitric acid.
- d) Justification For Including Magnesium Hydrogen Phosphate

Art Unit: 1792

- i) '027 teaches the use of metal phosphates as a means to introduce metal and phosphate ions to the solution (Column 2 Lines 54-60). Magnesium hydrogen phosphate meets this definition as a monobasic phosphate of magnesium (one OH^- group).
 - ii) H_3PO_4 and MgHPO_4 serve the equivalent function of providing PO_4^{3-} ions into solution. Therefore, it would have been obvious to add MgHPO_4 to the mixture of '027/'813; "It is *prima facie* obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).
- e) Justification For Including Chromium(III) Oxide
- i) '133 teaches a method of providing a phosphate-bonded ceramic coating to a titanium-alloy substrate for corrosion-protection properties (PG 0060).
 - ii) Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to have combined the method of '027/'813 with the method of '133 because both methods want to provide a corrosion protective coating to a titanium alloy substrate.
 - iii) '133 teaches methods of providing a phosphate-bonded ceramic coating using Cr_2O_3 as the oxide source (PG 0039-0040, 0060).

iv) CrO_3 and Cr_2O_3 serve the equivalent function of providing Cr ions into solution. A mixture of these compounds in solution is obvious for the same reasons as in the previous section.

f) Justification For Including Clay

i) '027/'813 teaches adding aluminum powder to protect against corrosion (Column 2 Lines 12-16).

ii) '717 teaches adding kaolin powder, a clay mineral also known as kaolinite, to a phosphate-bonded chromium ceramic coating for its chemical resistance, i.e. resistance to corrosion (Column 2 Lines 27-52). Kaolinite's chemical structure is $\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$, which includes aluminum.

iii) Aluminum powder and kaolinite are both shown to be suitable for providing corrosion resistance. Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use kaolinite in place of aluminum powder because the selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945).

g) Concentrations

i) The combination of '027/'990/'133/'717, as rendered obvious above, shows the claimed mixture but is silent as to the concentrations.

23) Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence

indicating such concentration or temperature is critical. “[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Conclusion

24) Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL G. MILLER whose telephone number is (571)270-1861. The examiner can normally be reached on M-F 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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